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SAN BENITO COUNTY

ENVIRONMENTAL RESOURCES AND CONSTRAINTS INVENTORY

GENERAL PLAN REVISION

1980

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EXISTING PRIVATE AND PUBLIC OPEN SPACE

A large portion of San Benito County is currently in some form of private or public open space land. These open space areas take the form of national and state parks, county parks, Williamson Act lands, and Public Domain lands. Illustrated in Plate 1, these lands are subjected to a wide variety of uses ranging from no public admittance in areas such as Paicines Reservoir to heavy recreational uses at Bolado Park. Table 1 summarizes the existing open space areas of San Benito County.

TABLE 1

EXISTING OPEN SPACE LANDS

Pinnacles National Monument	12,818 Acres
Fremont Peak State Park	244 Acres
BLM Land	115,000 Acres
Bolado Park	194 Acres
State Off-Road Recreational Vehicle Park	3,500 Acres
Williamson Act Land	563,999 Acres
	695,755 Acres

Source: San Benito County Planning Department, 1980.

Pinnacles National Monument, located 36 miles south of Hollister, encompasses 12,818 acres. In addition to being an interesting geologic area, the National Monument and areas near it have been designated as a State Game Refuge.

Fremont Peak State Park encompasses 244 acres. Located south of San Juan Bautista at the end of San Juan Canyon, the peak rises some 3,169 feet above sea level and gives a panoramic view of the area.

Seven miles south of Hollister on Airline Highway is Bolado State Park. This area has facilities for picnicing, swimming, horse shows, and rodeos. Developed through private contributions, the Bolado Park Golf Course is open to the public.

The Ridgemark Development (south of Airline Highway at the Fairview intersection) consists of some 350 acres developed into single family and condominium dwellings and an 18-hole public golf course.

Eight miles south, on Cienega Road, is one of the largest state owned and developed motorcycle parks. Approximately 3,500 acres of land provide-

extensive areas for riding and are combined with facilities for camping and picnicing.

Williamson Act land encompasses 563,999 acres and makes up approximately 63.1% of the County. Bureau of Land Management lands, also identified as Public Domain lands, incorporate 115,000 acres and make up 12.9% of the County.

WILDLIFE HABITAT

The preservation of wildlife habitat is the key to maintaining a healthy and abundant wildlife population. Wildlife habitats are increasingly being encroached upon by spreading urban influences and the higher intensities of use in previously remote areas. This results in a disruption of critical food chains, an altering of ground cover patterns and an interference with reproductive processes. Conservation then becomes a matter of increasingly active management, more restrictive use and an additional understanding of the natural interrelationships of ecosystems. The habitats found in San Benito County are briefly described below and are illustrated in Plate 2.

GRASSLAND COMMUNITY

Grasslands are usually found at low elevations and confined to flat lands or gently rolling hillsides that have a deep layer of clay bearing soil. The use of such land for urbanization, agriculture, and grazing has greatly altered the community's composition and distribution. The remaining natural fields and meadows provide the habitat for many birds which feed not only on the seeds of the grasses and the flowers, but also on the numerous field rodents and reptiles. The most widely recognized characteristic of this community is the expanse of wildflowers which appear briefly each spring.

Of special importance within the Grassland Community are the grasslands near Tres Pinos and Panoche. These areas have been identified by the California Department of Fish and Game as having an unusually high value as a wildlife resource. In particular, the San Joaquin kit fox ranges within these areas and is considered to be rare.

RIPARIAN COMMUNITY

The presence of water provides a favorable habitat for a variety of trees, shrubs, and grasses, as well as a habitat for the largest number of animal species of any vegetative community in San Benito County. The Riparian Community exists wherever there is a fairly permanent water supply. These areas serve as attractive habitats for many birds and animals on a permanent basis, while still greater numbers venture into riparian areas in search of shelter or to feed and obtain water.

Riparian habitats and members of the Riparian Community are extremely susceptible to destruction by natural processes and human activities. Any proposed changes should be carefully considered in terms of balancing the benefits against the possible risk to the wildlife community.

Riparian habitat, viable cold water streams capable of supporting salmon and steelhead, and wetland habitats have been greatly reduced in the past. Fish and wildlife are renewable resources, but the habitats of these resources must be protected. Major riparian habitats include the Pajaro and San Benito Rivers. These two rivers also support cold water fish, as do Lone Tree Creek and Laguna Creek.

CHAPARRAL COMMUNITY

The slopes and ridges of the foothills and mountainous regions of San Benito County exemplify the Chaparral Community. A large portion of southern San Benito County is made up of the Chaparral Community, consisting of deep-rooted shrubs, which are able to survive in dry, sunny locations. These provide habitat for an extremely wide variety of animal life, ranging from the common quail to the rare kit fox.

Much of the County's rugged and scenic area is covered with this dense impenetrable growth. Its highly flammable characteristics and difficult access combine to make this community one of the most hazardous to man.

OAK WOODLAND COMMUNITY

The Oak Woodland Community is characteristic of sheltered valleys and northfacing sides of canyons and is found predominantly in the western and southern regions of San Benito County. It forms a shelter for a wide variety of plant and animal species with the shade it produces keeping the temperature lower than in the surrounding grasslands and chaparral. This community has the highest rainfall and the lowest average temperature of any wildlife habitat in San Benito County.

Plants commonly found in this habitat include coast live oak, valley oak, poison oak, buckeye, laurel, madrone, ceanothus and manzanita. The oak woodland provides nesting areas for a wide variety of birds and shelter for a large number of animal species, including opossum, raccoon, skunk, blacktail deer and bobcat.

WETLANDS

An important resource to the County are the wetlands areas. These areas include San Felipe Lake, Tequisquito Slough and Paicines and Hernandez Reservoirs. These areas not only provide important habitats for wildlife, but are potential recreational areas.

WILDLIFE COMMUNITIES

The blunt-nosed leopard lizard, California condor, San Joaquin kit fox and giant garter snake are all listed as endangered or rare forms of wildlife by the State of California Resources Agency, Department of Parks and Recreation (Landscape Preservation Study; Appendix - Sierra Foothills and Low Coastal Provinces, September, 1973). The Resources Agency lists each as having a low likelihood of occurrence.

San Benito County also has good populations of game species, such as deer, wild pig, quail, chukar partridge and cottontail rabbit.

AGRICULTURAL SOILS

BACKGROUND

San Benito County has a total land area of 1,396 square miles, or 893,440 acres. Located in the California Coast Range, its westernmost tip is within ten miles of Monterey Bay, while its easternmost tip is approximately the same distance from the San Joaquin Valley. Physiograpically, its most striking features are the Diablo and Gabilan Mountain Ranges and the valleys between them. Elevations range from 80 feet near Aromas in the northwest portion of the County to 5,241 feet at the peak of San Benito Mountain in the southeast (U. S. Geological Survey Map NJ 10-12).

The following paragraph is from the Soil Survey of San Benito County, California, published by the U. S. D. A. Soil Conservation Service in 1969:

> "Farming is the main source of income in San Benito County. The principal crops are fruits and nuts, vegetables and other row crops, and small grains. The raising of livestock, namely beef cattle and sheep, is also important. Lack of water is the main factor limiting production in this County. Where water is available, irrigated fields are intensively cropped. Ponds and reservoirs are used for watering livestock on range and pasture." (Pg. 1)

DESCRIPTION AND EXTENT OF SOILS

Plate 3 illustrates the agricultural soils within San Benito County. These soils, found on terraces, alluvial fans and flood plains, include most of the farmland within the County. These lands occupy approximately 15% of the total land area. The Soil Conservation Service has identified five major soil associations in this group.

Of the five associations, the Sorrento-Yolo-Mocho Association and the Clearlake-Pacheco-Willows Association are the most productive and intensively cultivated soils in the County. These two associations alone make up approximately 9% of the total land area of the County.

The Edenvale-Conejo Association and the Panoche-Los Banos-Panhill Association represent an additional 4% of the land area and are potentially highly productive soils. However, according to the Soil Conservation Service, the lack of irrigation water limits the use of soils and is

available only in parts of the associations.

The remaining association, the Rincon-Antioch-Cropley Association, is used for fruits, nuts, row and field crops. Erosion is a problem on this soil in areas where it is more sloping, and in some places the irrigation water is of poor quality due to the high boron content. This soil association represents approximatey 2.6% of the land area.

Perhaps it is most important to note the percentage of agricultural land that each association represents. Table 2 groups the associations according to their limitations and provides information with respect to the percentage of agricultural land, the total aerial extent as compared to the County and the number of acres.

TABLE 2

SOIL GROUPINGS

GROUP	ASSOCIATION	% OF TOTAL LAND	ACRES*	% OF AGRICULTURAL LAND
A	Sorrento-Yolo-Mocho	6	53,610	39
A	Clearlake-Pacheco-Willows	3	26,800	20
B	Edenvale-Conejo	0.7	6,250	4
B	Panoche-Los Banos-Panhill	3	26,800	20
C	Rincon-Antioch-Cropley	2.6	23,230	17
	TOTALS	15.3	136,690	100

Source: TERRA-SOL, LTD., 1980.

Portions of the Clearlake-Pacheco-Willows and the Rincon-Antioch-Cropley associations near Fairview Road (north and northeast of Hollister) have shallow root zones (less than 20 inches) making them suitable for row crops and hay, but not for any crops requiring deep soils. (personal communication: Phil Fitzbuck, May, 1980).

The two soil associations making up Group A represent almost 60% of the productive agricultural land within the County. These associations are shown in Plate 3. It can be seen that approximately three-fourths of the productive agricultural land is located north of Tres Pinos to the County line and from Hollister west to Highway 101, in the San Juan Valley. The

remainder of these soils are located in Bear, Topo and Bitterwater Valleys and in the area of San Benito.

EROSION

BACKGROUND

Erosion is a serious problem in two distinct, but closely related aspects. On the one hand, it depletes a very valuable natural resource and on the other, it produces sediment, which is one of the most damaging factors to the economy and the environment. Thus, when one addresses the problem of erosion, one should consider not only the wear and removal of material from one site, but also its deposition at another.

Erosion can be a major problem when the natural cover of the soil has been disturbed. Loss of topsoil can occur within a few days or even hours if a slope is left uncovered during the rainy season. This can cause severe problems for not only the land owner, but the County, as topsoil frequently ends up in streets, storm drains and on adjacent property. Erosion also causes siltation in streams, restricting the recharge ability and frequently damaging aquatic life.

Soil erosion may result from natural causes, such as rainstorms, windstorms and geologic disturbances, or from man's activities. The construction of roads and driveways, building pads and other improvements during the normal course of development for residential, commercial or industrial property exposes topsoil to the elements, which may erode it.

Erosion prevention measures include restrictions on grading during the rainy season, as well as grading and land engineering practices designed to prevent erosion problems and landsliding. The reduction of erosion losses is the responsibility of the developer, who modifies the land surface, as well as the governmental agency, which reviews and regulates land modification.

It is the County's responsibility to require landscaping plans, detailed erosion control plans (such as grading plans) and details on the construction of retaining walls and drainage systems. The County is then responsible for inspecting the work as it is constructed and giving final approval to a successfully completed project.

EVALUATION OF EROSION HAZARDS

The soils located on terraces, alluvial fans and flood plains generally have little or no erosional problems. Gullying and erosion does, of course, occur on some of the more sloping soils within these areas. Erosion hazards are shown on Plate 4. The slight to moderate category represents approximately 15% of the County and corresponds to the areas shown in Plate 3 as prime productive agricultural soils.

Approximately 15% of the County is ranked by the Soil Conservation Service as having moderate to severe erosion potential. These soils, which are made up of the San Benito-Gazzos-Linne Association and the Sheridan-Cienega-Auberry Association, are located along the westerly boundary of the County and extend from the north all the way to the southerly extremities through the center.

Approximately 35% of the County is considered to have severe erosion hazards. This potential for severe erosion is concentrated along the easterly boundary of the County, with smaller areas west of Hernandez Valley in the Clear Creek area and around Red Mountain. Two extensive areas for significant soil erosions are present west and north of San Juan Bautista.

SEPTIC LIMITATIONS

BACKGROUND - HOW SEPTIC TANK SYSTEMS WORK

Wastewaters from rural dwellings and other buildings are usually disposed of in the ground. If soil and site conditions are favorable, a septic tank system can be expected to provide satisfactory service. In a septic system the intermittent flow of waste materials is decomposed by anaerobic bacteria. Most septic tanks are designed with two compartments and have a minimum of 1,200 gallons of capacity. Within the septic tanks, anaerobic biological treatment takes place, solids are removed and sludge and scum are stored. The clarified liquid is then discharged into a leach line and percolated into the soil.

The first step in the design of a septic system is to determine whether the soil is suitable for absorbing the effluent water, and if so, at what rate. The soil must have a satisfactory absorption rate without interference from ground water or impervious strata. The minimum depth to ground water should be greater than four feet and impervious strata should be at a depth greater than four feet below the tile trench or seepage pit.

If these conditions cannot be met, the site is generally unsuitable for a septic tank installation.

The County Health Department maintains standards for evaluating the suitability of soils for septic disposal.

Studies with infiltration ponds indicate that harmful bacteria are reduced to a safe level somewhere between four and seven feet in unsaturated sandy silt. In more coarse textured soils, distances of up to 250 feet may be required to reduce bacteria counts to acceptable levels.

HOW SEPTIC TANKS FAIL

In a soil with insufficient permeability to allow for occasional development of aerobic conditions, there will be what is called "anaerobic plugging" of the gravels. Anaerobic plugging is caused by the growth of organisms within the percolation trench and can result in system failure.

Within the geologic environment there are a number of ways that systems may fail. The first type of failure is the saturation of the leach line, causing fluid to rise to the surface of the ground. This is usually a result of a rise in the water table or the plugging of the filter soils (as described above). In some instances, outright overloading due to poor design can result in the saturation of the leach line system.

A failure of the system caused by a high water table usually occurs because the design of the system was based on tests conducted when the water table was low. This can be prevented by conducting tests during the wettest time of the year, or when the water table is at its highest.

It should be noted that a natural rise in the ground water table will occur as urban development increases in a given area. As population increases, water is usually imported to irrigate lawns, as well as for domestic uses (Source: Water Facts and Figures for Planners and Managers, USGS Circular 601-I). After it is used, it is added to the natural ground water regime either through irrigation or through disposal facilities of individual homes.

The slope on which a leach field system is constructed is critical. The degree or angle must be sufficiently small as to allow adequate percolation of effluent and to prevent surfacing of the effluent downhill. According to an article published in California Geology (September 1972), "Experience has shown that when slopes exceed 20% regardless of the soil or rock type, it is probable that effluent will surface downhill from the

system regardless of the depth of burial."

One factor that is usually overlooked in onsite disposal systems is in the area where ground water is used for domestic purposes. When disposal takes place there may be rapid nitrate build-up in the ground water. Nitrate is released from septic systems and is not filtered out by the soil medium. The build-up occurs when the percolated effluent cannot escape from the area either because of pumping or because it is in a geologically isolated basin.

The direction of ground water movement is identified in the section on Ground Water Resources of this Evironmental Inventory. As rural residential development increases, the quantities of nitrates within the ground water table can be expected to increase. These would then move toward the cones of depression identified in the Hollister and San Juan Valleys, ultimately being taken up in the incorporated community water system. This, in turn, would require extensive treatment of the water prior to the consumption of the water by urban residents.

SEPTIC LIMITATIONS IN SAN BENITO COUNTY

Within San Benito County, 97,855 acres of soil are identified by the Soil Conservation Service as having slight to moderate septic tank limitations. This represents approximately 11% of the entire County. The remainder of the soils (89%) have severe limitations. The soils, their approximate area, their percent of the entire county, and their limitations are given in Table 3 on the next page.

TABLE 3

SOIL LIMITATIONS FOR SEPTIC DISPOSAL

SOIL NAME	AREA IN ACRES	PERCENT OF COUNTY LAND AREA	SEPTIC LIMITATIONS
Corralitos	375	-	slight to moderate
Edenvale	3,525	0.4	slight to moderate
Hanford	4,970	0.6	moderate to severe
Kettleman	43,265	4.8	slight to moderate
Metz	3,105	0.4	moderate
Moco	3,585	0.4	moderate
Panhill	3,615	0.4	moderate
Panoche	13,560	1.5	moderate
Reiff	2,095	0.2	moderate
Sorrento	14,200	1.6	moderate
Yolo	5,560	0.6	moderate

SOURCE: United States Soil Conservation Service "Soil Survey, San Benito County, California."

GROUND WATER RESOURCES

Any plan for land use or conservation requires consideration of water: How to get it, how to use it and how to dispose of it. Every new subdivision will have to have domestic water and facilities to dispose of wastewater. Every industrial site requires provisions for both potable water and for processing and/or cooling water. County and city parks need water for visitors, landscape maintenance, wastewater disposal and oftentimes for recreational purposes.

Urbanization has brought with it a host of new demands on natural resources and the physical environment. Problems involving water as a vital resource and a powerful environmental agent are among the most critical that planners will have to consider. These problems include the maintenance of both the quantity and quality of the water supply in San Benito County. The major responsibility in planning is for the maintenance of water for recreation, general welfare and the alleviation of hazards caused by floods, drainage, erosion and sedimentation.

Within San Benito County the major water resources lie in the San Juan and Hollister Valleys. These valleys, located in the northern end of the County, encompass an area of approximately 102 square miles. They comprise the southerly limits of the Hollister Ground Water Basin (California Division of Water Resources, January, 1980).

In 1972, the Geological Survey, Water Resources Division published a report entitled "Groundwater Hydrology of the Hollister and San Juan Valleys, San Benito County, California, 1913-68". It is this report that provides much of the basis of the information contained in the evaluation of ground water resources for San Benito County.

The Calaveras Fault separates the Hollister Ground Water Basin into the Hollister Subbasin on the east and the Gilroy-Bolsa and the San Juan Subbasins on the west. These latter basins are separated by the Sargent Anticline, extending along the ridge of the Flint Hills. The northern boundary of the Hollister Basin is defined as the Pajaro River.

Alluvium is the principal water bearing unit and consists primarily of unconsolidated or poorly consolidated deposits of clay, silt, sand and gravel, or loosely unconsolidated sandstone.

Although sufficient ground water for stock and domestic use is

available nearly everywhere in the valleys north of Tres Pinos, declining water levels have partly dewatered sand beds and "a significant part of the total ground water pumped in most of the area is now being obtained by depleting storage" (U.S. Geological Survey, Page 40).

The U.S. Geological Survey noted that most irrigation wells yield from 200 to 800 gallons per minute, except in the area east of Fairview Road, between Airline Highway and Lone Tree Road. Here, smaller amounts of sand and gravel yield smaller amounts of water to wells the more permeable and thicker formations elsewhere.

With the development of irrigation wells in 1878, a continuous process of "mining" of a natural resource has taken place. This continued pumping of ground water from the 1870's to the present has significantly affected the direction of ground water flow and has caused large cones of depression to form in each of the three major ground water basins (U.S. Geological Survey, Page 18). In fact, ground water flow since the 1940's has literally reversed itself. In the 1940's ground water flow was out of the valley toward the Santa Clara area. Although it was once believed that the most significant amount of recharge was from subsurface flow from the Santa Clara County area (U.S. Geological Survey, page 18) recent testimony before the Department of Water Resources shows that only insignificant amounts of water cross the Pajaro River into San Benito County.

The major source of recharge are creek beds (surface) and subsurface flows to the east and from surface and subsurface flows from the Flint Hills area into the Bolsa.

The approximate net water level decline since 1913 has been about 100 feet in the San Juan Subbasin and more than 180 feet in the Gilroy-Bolsa and Hollister Subbasins. Consideration should be given to the fact that the Hernandez Dam was in operation during only the last four years of the U.S. Geological Study. An effective recharge program has significantly increased the ground water reserves.

With the exception of two drought years, the Hernandez Reservoir has had several years with storage of over 10,000 acre-feet and three years during which the reservoir was full. Evidence of the effectiveness of the recharge program can be seen in the wells of the Hollister Basin. One of the wells showed a decrease in depth to water from 172 feet in 1971 to 126 feet in 1980.

Plate 5 illustrates the basic ground water regime. This plate is a simplified version of Figure 6 of the U.S. Geological Survey Report and has been modified to reflect the renaming of the Gilroy-Hollister Basin to the the Hollister Basin.

RECHARGE AND WATERSHED AREAS

Sources of natural ground water recharge in the Hollister and San Juan Valleys are infiltration from streams, direct infiltration of rain and subsurface flows from surrounding areas, such as the Flint Hills. Although recharge from rain varies from year to year, the U.S. Geological Survey estimated that it could average from 20% to as much as 40% of the total available recharge from all sources. This figure indicates the value of surface water percolation and conversely, the inherent dangers with excessive covering of soils by impervious surfaces.

In the Hollister Subbasin, ground water is derived mainly from rainfall and stream flow. The most likely source for stream flow recharge is from Arroyo dos Picachos, Santa Ana Creek, Tres Pinos Creek, and the San Benito River.

In the San Juan Subbasin, most of the ground water is from inflow from areas immediately west of Hollister. Inflow from the San Benito River and from rain water and surface flow comprise the largest portion of this ground water resource.

San Juan Creek flows directly into the large cone of depression immediately north and east of the community of San Juan Bautista.

In the Gilroy-Bolsa Subbasin, recharge from surface sources is from rain and irrigation water that percolates into the soil. Some water may be derived from the Pajaro River, but the largest and most significant amount of recharge is from the surface and subsurface inflow from areas around the basin.

Artificial ground water recharge has a total of two major sources. The Pacheco Pass Water District augments recharge in Pacheco Creek during the spring and summer. The San Benito County Water Conservation Flood Control District operates a recharge program in the natural courses of the Tres Pinos Creek and San Benito River, providing some offset of the "mining" of ground water for irrigation and urban uses. An annual overdraft of some 7,000 acre-feet still occurs.

A future source of water is the San Felipe project. This project will provide some ground water recharge. Storage will be provided at the San Justo Reservoir.

The Hernandez and Paicines Reservoirs release water during the drier months to aid in ground water recharge.

According to the U. S. Geological Survey, "the results of the very limited study of the feasibility of artificial ground water recharge suggests that present stream channels are the best places for recharging the ground water reservoir" (U. S. G. S., Page 30). Although they noted that the feasibility of recharging imported or surplus waters in the Fairview area in the eastern part of Hollister Valley could be undertaken, further studies showed that a direct distribution system would be more beneficial. Such an effort may directly aid in the reduction of the boron content in the upper water bearing strata. The County Water District actively discourages any wells in the area affected by boron. This area, generally east of Fairview Road, will be served by a pipe system carrying imported water, rather than by wells. Residents of this area will be able to draw from the pipe for lawn use at sprinkler pressure.

Another important water resource is the watershed lands, which include much of San Benito County. Watershed lands are important because they provide ground water regeneration for other water sources.

Brush and forest lands on steep terrain within the watershed should be managed so as to prevent excessive runoff and erosion damage downstream. The intrusion of urban land use on steep hillsides, in addition to being a fire hazard, presents definite problems with respect to siltation and erosion. Subsequent downstream damage can be difficult and expensive to repair.

SURFACE WATER RESOURCES

San Benito County has limited surface water resources. These resources include the San Benito River, the Pajaro River, the Hernandez Reservoir, intermittent tributaries to the San Benito River, as well as an intermittent lake. San Justo Lake is located between San Juan Bautista and Hollister on the south side of Highway 156. San Felipe, also known as Soap Lake, is located just south of Highway 156, about 12 miles north of Hollister at the County line.

The San Justo Reservoir would be constructed on a small tributary to San Juan Creek. The proposed reservoir would have a surface area of some 200 acres and would contain 9,900 acre-feet of water.

Recreation values at San Justo will probably be minimal because of the annual drawdown which is proposed. Recreation facilities are planned on the site, as well as minimum safety and sanitary facilities.

In 1962, the San Benito County Water Conservation and Flood Control District constructed Hernandez Dam and Reservoir on the San Benito River approximately 50 miles southeast of Hollister. This reservoir has a capacity of 18,700 acre-feet and yields a ten year average of 12,200 acre-feet of water. Controlled releases are percolated into the San Benito River at the time of release or temporarily stored at the 3,200 acre-foot Paicines Reservoir for later release into Tres Pinos Creek. Surface water resources are shown in Plate 5. Areas of flood hazard are also shown on that map and are discussed below.

The Pacheco Pass Water District operates a dam and reservoir located in Santa Clara County, which serves the northeastern part of the irrigated land in San Benito County. The area is roughly north of Comstock Road.

FLOOD HAZARDS

The flood season generally lasts from November through April. Over 90% of the annual precipitation falls during these months. Statistically, January has been the wettest month.

More than just the quantity of rain affects flood levels. Natural obstructions to flood flows include trees, brush and other vegetation growing along stream banks in flood-way areas. Of particular hazard are man-made encroachments on or above the streams. Bridges, culverts, and building pads are obvious examples and can create more extensive flooding than would otherwise occur.

During floods, debris may be washed and carried down the stream to collect on bridges and other obstructions. Bridges may be damaged or destroyed. Culverts may be plugged or debris may pile up, causing increased flood height due to backwater. As the flood increases, masses of debris may break loose and the accumulation of water and debris can surge downstream until another obstruction is encountered.

At the present time most of the land subject to flooding within San Benito County is in agricultural use.

The flood prone areas, shown in Plate 6, are based on the November, 1979, National Flood Insurance Program Maps delineating flood hazard boundaries.

These flood prone areas have a one-in-100 chance, on the average, of being inundated during any year.

More commonly referred to as the 1% flood, the flood-way is the channel of a stream that must be kept free from encroachment in order that a 100-year flood might be accommodated without substantial increase in flood height.

The flood-ways in San Benito County are restricted almost entirely to areas immediately adjacent to either side of river and creek channels. In the northernmost portion of the County, the Pajaro River has the potential of inundating much larger areas, but as is shown on the map, most of the flood waters are expected to be contained within the Tequisquita Slough.

It is important that the County keep these designated flood areas free from encroachment in order to minimize future loss of life and property. Encroachment into the flood plain can be accommodated with proper mitigation, so long as the shift of flood waters does not increase adjacent flood-ways or flood plain areas in excess of one foot. In this regard, the Colby-Alquist Flood Plain Management Act of 1965 requires that local governments adopt regulatory measures, which prevent encroachment into designated flood-ways as a prerequisite to state financial assistance in cost of land, easements and rights-of-way.

MINERAL RESOURCES

SAND AND GRAVEL

Among the principal economic minerals within the County are the sand and gravel deposits of the San Benito River. These deposits are presently being mined in a number of locations. In addition, alluvial deposits in the hills also have the potential for use as a natural resource. At the present time the ready availability of materials in the San Benito River, the high cost of transportation and the excavation of overburden makes other alluvial deposits marginal to infeasible economically.

LIMESTONE

Extensive deposits of limestone are located near San Juan Bautista. The major deposit was quarried by Ideal Cement Company for many years until the plant closed. Fremont Peak and the Bird Creek and Cienega areas also contain large deposits of limestone. The FMC Corporation is presently marketing a large deposit of dolomite (a Calcium - Magnesium Carbonate) in the Bird Creek-Cienega area. The limestone deposits of the Mount Harlan-McPhails Peak district contain the only known chemical grade deposits of limestone in San Benito County. These deposits are located generally west of Cienega Valley between Pescadero Canyon and McPhails Peak.

Several lime kilns were operated in the area prior to 1910. However, as the lime deposits are remotely situated from markets and rail transportation, there has been less incentive to develop this resource.

A detailed report entitled "Limestone and Dolomite in the Northern Gabilan Range, California" (C. D. M. & G. Special Report 56) describes, in detail, the location of limestone and dolomite deposits in San Benito County.

GRANITE

A large deposit of a unique hornblend diorite commonly called "granite" is located in the Aromas area south of the Pajaro River, west of U.S. 101 and just east of the Monterey-San Benito County line. This deposit (the Logan Quarry) is presently (1980) being mined by the Graniterock Company and is used on construction sites throughout Central Coastal California.

OTHER MINERAL RESOURCES

Magnesite deposits are found in the Sampson Peak area. Bentonite is found near Willow Creek and Panoche. Mercury was once mined extensively at New Idria. Cinnabar and antimony have been found in the northeast corner of the County.

Oil fields in the Vallecitos Valley southwest of the Griswold Hills have continued to produce low volumes of oil and as the cost of oil increases, this area could become more productive.

In the South County area asbestos has been mined by Union Carbide in their "Joe Pit". These resources are located in Sections 23 through 25 of Township 18 South and Range 12 East.

AIR RESOURCES

In the past, air has seldom been considered as a natural resource. However, clean air is a basic and vital resource to a community. Unlike other resources which may be useable to a few, clean air is a resource vital to all. Air quality is of regional concern and San Benito County finds itself affected by neighboring communities, such as Santa Clara County and Monterey County.

The climate, wind and rain patterns strongly influence air quality. Even though the amount of air pollution is emitted at a fairly constant rate throughout the year, the amounts of air pollution actually present in the air we breathe fluctuates widely from day-to-day. These variations depend wholly upon the weather. Rain and air changes that accompany rain are important cleansing mechanisms.

Open space performs several vitally important air quality functions. Vegetation is an important part of the natural air filter system. Particulates are captured by vegetation. The presence of vegetation can reduce dust particles by as much as 90%.

Limited air quality data are available for San Benito County. The air quality was last studied in May, 1973, to January, 1974, by the California Air Resources Board. Pollutants measured included oxidants, carbon monoxide, nitrogen dioxide, total hydrocarbons, suspended particulate matter and particulate lead. The State standards for oxidants and the 24-hour standard for particulate matter were exceeded on several occasions. Standards for carbon monoxide and nitrogen dioxide were not exceeded.

The highest oxidant concentrations occurred during late spring and early fall, while other pollutants peaked during the fall and winter months. These peak periods can be directly attributed to the light winds and relatively stable atmosphere during the fall and winter months. During calm periods, suspended particulate concentrations often exceed the State standards.

The prevailing climactic conditions, together with the physical characteristics of San Benito County, favor the formation of concentrated air pollutants. Abundant sunshine, low precipitation and light winds, in combination with narrow valleys surrounded by steep mountains, are conditions which tend to concentrate pollutants. The general air circulation patterns substantially aid the transport of these pollutants over long distances.

This is most readily apparent when heavy concentrations of pollutants can be seen as they move south from Santa Clara County into the San Juan and Hollister Valleys. Pollutants generated in northern San Benito County easily move down the long axis of the County and the effects can be felt many miles away.

Agricultural, industrial and urban activities in the County are the major sources of air pollution. According to the Monterey Bay Air Pollution Control District, motor vehicles are the largest source of organic gases and it is anticipated that with increased population, industry and motor vehicles, a potential for developing higher than current air pollution levels in the County does exist.

Those trends which contribute to air degradation (urbanization, industrialization and automobile use) are a continuing fact of life. San Benito County is just beginning to feel the effects of the policies of other counties. The combined effect of area policies shows an increase in separation between employment and residential areas. This directly increases commute trip distances. Additional miles traveled increase carbon monoxide pollution potential all along the routes and contribute to excessive ambient air pollution of several types.

Miles traveled to jobs and schools is only part of the travel demand. Service uses also create significant numbers of trips. Most activities are now geographically separated by considerable distances.

Patterns of air pollution are also important. Future industrial areas will be located north of Hollister and since the winds are out of the west and southwest most morning hours, it is expected that these pollutants will be carried away from the urbanized areas. However, afternoons will find a reversal of wind patterns, with air pollution being carried into the city.

Land use policies do not currently set residential areas away from the freeways or heavily traveled roadways which will, in the future, become very heavy carbon monoxide and lead pollution sources.

Present rural zoning allows low density residential uses outside of urban service areas. Many rural residents in the future will not primarily be employed on their land. Each residential use established outside urban service areas, particularly in locations where employment areas are not close by, establishes a use in which additional increments of excessive air pollution can result.

Many currently allowed rural land uses have significant air pollution potential. Land clearing, controlled burning, industrial activities related to cement, gravel and mining operations and the regular use of unimproved roads all have significant local and, in some cases, County-wide pollution impacts. As the County population increases, these sources impact more and more people. Practices that may have been acceptable in the past will become subject to question in the context of a large population.

Local governments have very direct responsibility for maintaining the health, safety and welfare of their citizens. Air pollution affects citizens in each of these areas. County, as well as city governments, regulate land use decisions. Pollution is generated in separate jurisdictions, but directly impacts everyone in the County.

Factors which will influence air quality include:

1. Overall population and particular activities pursued.
2. The location or arrangement of populations.
3. Activities on a regional basis.
4. The amount and type of fuels burned.
5. The amount of open space and its location.

Adverse air quality conditions with airborne particulates and noxious gases cause numerous effects on the health of the inhabitants of San Benito County. Eye irritations, increased potential for lung disease, restricted breathing, increased susceptibility to bronchitis and pneumonia, irritation of mucous membranes in the nose and throat, choking, headaches, dizziness and accelerated fatigue are some of the known effects that are possible results of poor land use planning. Many of these effects have been noted by residents of San Benito County as they visit such places as Los Angeles or Santa Clara.

HAZARDOUS FIRE AREAS

As in most of California, San Benito County has a Mediterranean type climate, with mild winters and hot, dry summers that combine with rugged mountains and limited access to make fire control difficult.

Much of the vegetation in San Benito County consists of brush or chaparral. That, in combination with oak grassland and hot, dry, and windy conditions during summer and fall months, does present critical fire hazards. Natural vegetation, which makes pleasant surroundings for homesites, is extremely flammable.

Wildfires take a heavy toll in lost vegetation and damage to watersheds and viewsheds as urban uses encroach on wildlands. Structural damage becomes an ever increasing possiblity. Much of the loss might be avoided through the identification of risk areas and the corresponding application of strict building regulations with respect to siting and construction materials.

The value of watershed lands is discussed under Water Resources. In addition to its capacity for receiving and passing water into surface and ground water tables, these lands are valuable for recreational use, which is becoming more and more important to our society. Wildlands are prime recreational areas and host a wide range of outdoor sports and activities, including hunting, fishing and motorcycle riding.

Fuel, climate, accessibility, and slope are factors which are used to determine fire hazard areas. The Department of Forestry provided San Benito County with a map showing areas of moderate and extreme fire hazard. That information has been reproduced on Plate 7. A set of 37 detailed maps is on file with the Planning Department and should be used for site specific determination of hazards.

Fire hazard does not preclude development. However, it must be considered an area of important constraint. The accessibility of an area has direct correlation with fire hazards. Fire response times in excess of five minutes are considered hazardous to persons and property.

The County should recognize that the approval of urban developments, even on large acreage lots, when they are far removed from County services such as police and fire protection, will directly increase the costs and hazards to persons living within the County.

SEISMIC HAZARDS

San Benito County is affected by the San Andreas Rift Zone and the Calaveras Fault, as well as many other small faults. These two faults are known worldwide. Active faults within the State of California have been of such importance that the Legislature passed Chapter 7.5, Division 2 of the California Public Resources Code, which required that the State Geologist provide Special Studies Zone Maps to delineate areas of known active faulting. Numerous other studies have been undertaken by state and federal agencies. With few exceptions, these studies either show faulting at a very small scale with little detail or at a very large scale with great detail. Neither scale is useful for General Plan purposes.

One study, the 1973 Geology of California Maps prepared by the California Division of Mines and Geology, is at a scale identical to that used for the General Plan (1" = 4 miles). Faults shown on the Santa Cruz Sheet (N10-12) are shown on Plate 8, along with the Special Study Zones. Where the two sources overlap, only the Special Study Zone is shown.

In order of decreasing potential for loss of life and property damage, earthquake hazards in San Benito County include ground shaking, ground failure, ground rupture and inundation.

GROUND SHAKING

Earthquake generated ground shaking, in many instances, causes the most widespread earthquake damage (Nichols, 1974). This phenomenon is considered to be potentially the most hazardous in many areas. It affects the greatest number of people and is present, to some extent, in all earthquakes. Ground shaking is also one of the most difficult of earthquake hazards to predict or quantify.

In a broad sense, the severity of ground shaking appears to be related to the firmness of the ground. Areas underlain by thick, saturated, unconsolidated sediments, such as those found in the Hollister and San Juan Valleys, will experience greater shaking motion than areas underlain by firm bedrock. In other words, ground shaking will have a lesser affect on buildings and persons in areas of hard granite than it will on buildings and persons located on thick beds of sand or other unconsolidated sediments.

Additional factors in the assessment of ground shaking severity and associated damage include the magnitude of the earthquake, the

acceleration, the number of shocks, the duration of the shocks, the distance from the epicenter, the structural integrity of the building and the relationship between the waves or vibrations of the ground motion and the fundamental period of the building. The fundamental period of the building is controlled by its height, while the fundamental period of the ground movement is controlled by the local geologic and hydrologic conditions. Damage is particularly likely to occur when the natural vibration or period of a building is similar to that of the soil deposit on which it is constructed.

Damage to structures is caused by the transmission of earthquake waves from the ground into the structure and back again.

GROUND FAILURE

Earth materials in a natural condition tend to reach an equilibrium over a long period of time. In geologically active areas there are many regions where earth materials have not yet reached a natural state of stability. In addition, man's activities tend to make earth materials less stable, and increase the chances of ground failure. Some of the natural causes of instability are earthquakes, weak materials, erosion, and rainfall. Human activities which contribute to instability include oversteepening of slopes by undercutting or overloading them with artificial fill, extensive irrigation and poor drainage. Ground withdrawal with removal of stabilizing vegetation can also contribute to the instability of earth materials (Nichols 1974). These everyday causes of failure can produce landslides or settling and are enhanced during earthquakes by the strong ground motion which results in rapid changes in these materials.

Various processes and phenomena are grouped within the general classification of ground failure. These include landsliding, liquefaction, lateral spreading, lurch cracking, differential settlement, and bedrock shattering. All of these involve a displacement of the ground surface due to a loss of strength or failure of underlying materials during ground shaking.

Landslides and liquefaction are the two most likely forms of ground failure to occur in San Benito County. Ground displacement along the Calaveras or San Andreas Fault is taking place daily. This form of movement, called "creep", is not usually damaging to structures on a catastrophic basis. Over long periods of time however, damage to foundations, roads,

sidewalks, and utilities does occur.

Liquefaction, the temporary loss of strength recognized as a "quick" condition, can result in ground failure. Liquefaction has been known to adversely affect buildings even when the beds which liquefy are located at depths of 30 and 40 feet. Structures may rotate or slowly sink into the soil. In more urbanized areas of Hollister and San Juan Bautista water levels vary from 80 to over 200 feet.

Landslides involve a downslope movement of soil or rock materials and can range from rock falls to earth flows. Earthquake induced landslides will occur generally in the same areas as landslides induced by other natural forces. The addition of earthquake energy may induce landslides that otherwise might not have occurred.

Regardless of the source, landslides are due to the failure of either surficial material or, in some cases, bedrock. Failures usually result from a combination of factors including unstable or weak rock and soil materials, adversely oriented geologic structures, insufficient vegetative cover, high water content, over steepened slopes, or high slope angles.

Urban development can affect landslide potential by increasing slope angles, removing downslope supporting earth materials, adding weight upslope of fill or construction, and the addition of water by gardening, septic tank effluent, or the directing of surface drainage into unstable areas. The area northeast of San Juan Bautista, known as the Sargent Anticline (a portion of Flint Hills) is an excellent example of an unstable area which contains landslides resulting from both earthquake generated forces, man-made forces, and the addition of rain water.

GROUND RUPTURE

The San Andreas and Calaveras Fault Zones are considered to be active faults in San Benito County. The term "active" for this report is the same as the one officially adopted by the State Mining Geology Board with reference to the Alquist-Priolo Geologic Hazard Zones Act that includes faults that have moved within the last 11,000 years.

In compliance with the Alquist-Priolo Geologic Hazard Zones Act, the California Division of Mines and Geology has established Special Study Zones along fault traces considered active or potentially active. Special studies relating to earthquakes are required before development within these zones can occur. The boundaries of these Special Study Zones are

shown in Plate 8. The reader is cautioned, however, that more detailed official maps of one inch equals 2,000 feet are available for viewing in the Planning Department and at the County Clerk's Office.

Vertical and horizontal displacement has occurred along both the San Andreas and Calaveras Faults. It is reasonable to assume that displacement will occur along these faults in the future.

Fault creep, that is the slow but steady movement along a fault zone, has deformed numerous streets, curbs, gutters, and homes in the community of Hollister. Creep along the San Andreas Fault is visible in the San Juan-Hollister Road area just east of The Alameda in San Juan Bautista. Continuous repairs are required both on state and county roads as a result of this slow, but damaging, movement.

LANDSLIDE SPLASH HAZARDS (Seiche)

If a large earthquake generated landslide should enter the Hernandez Reservoir, or any of a number of privately owned reservoirs, a wave could be generated that could damage shoreline development and possibly overtop the dam. Factors to be considered in a site-by-site evaluation should include the length of time that the reservoir is full or nearly full, the depth of the water, and the configuration of the water surface, as well as the downstream topography.

Although the chance of the complete failure of the Hernandez Reservoir is remote, it does exist. Little damage is likely to occur due to the remote location of the dam. However, proposals for development in the area should include an analysis of the potential for inundation damage.

FLOOD HAZARDS

Flood hazards were previously discussed under Water Resources. Flood prone areas are shown on Plate 6 and are, for the most part, in agricultural use.

HISTORICAL AND CULTURAL RESOURCES

PREHISTORIC INHABITANTS

Knowledge of the Indians who occupied the area now known as San Benito County is limited. Remaining artifacts of the Indian culture include imperishable artifacts, such as stone, shell and bone. Their economy consisted entirely of hunting and gathering, lacking agricultural and domesticated animals.

THE MISSION PERIOD

Five Spanish expeditions crossed the area in the late 18th century: Anza and Font, Palou, Fages and Crespi, Fages, and Danti and Sal. The diaries of these explorers provide data on the condition of the environment during various seasons and the existence of early villages and settlements.

In their expedition of 1795, Danti and Sal explored the San Benito Valley and found two suitable mission sites: One situated near the present day City of Gilroy and one on the San Benito River, which was named in honor of St. Benedict. The latter site was chosen and on June 24, 1797, the Mission San Juan Bautista was founded. The pueblo of San Juan Bautista became the first white settlement in San Benito Valley.

THE EARLY AMERICAN PERIOD

The City of Hollister, located seven miles east of San Juan Bautista, became a sheep raising center in the mid-19th century. A group of 50 farmers formed the San Justo Homestead Association in 1868 and purchased 21,000 acres of land located in at the eastern part of Rancho San Justo from sheep rancher Colonel William Hollister. Of this land, 100-acres was reserved for what is now the City of Hollister. When the Southern Pacific Railroad was routed through Hollister, the town grew in size and eventually overshadowed San Juan Bautista, which had been bypassed by the railroad.

Up until this time the area now known as San Benito County was a part of Monterey County. The settlement of the San Benito Valley and the surrounding area is separated from the rest of Monterey County by the Gabilan Mountains. This mountain range prompted the eventual division of the two areas. San Benito County, which takes its name from the San Benito River, was formed in 1874, following a five-year battle by the "divisionists" which was finally resolved at the senate level.

Although San Benito County contains only two incorporated cities,

Hollister and San Juan Bautista, a number of unincorporated towns and settlements formed in the 19th century. These unincorporated areas were formed primarily through the concentrations of homesteaders in different parts of southern San Benito County.

Tres Pinos, eight miles south of Hollister was, for a time, the southern terminus of the San Benito branch of the Southern Pacific Railroad. Tres Pinos was a shipping point for a large area that produced grain, hay, dairy products, etc.

The town of Paicines, which was originally known as Tres Pinos, is located several miles south of what is now known as Tres Pinos and consisted, even during its busiest times, of little more than a hotel, school and Snyder's General Merchandise Store. Snyder's Store gained its notoriety from having been robbed by the bandit Tiburcio Vasquez in the 1870's. It was this robbery and shoot-out which resulted in the killing of three men, leading to Vasquez's hanging.

Located to the southeast of Paicines is Panoche, a settlement which is historically significant as a stagecoach and ore wagon stop. Ranches in the Panoche Valley provided overnight lodging for travelers destined for the New Idria Mines to the east.

The New Idria Quicksilver Mines went into operation in 1854. One of the three largest quicksilver mines in the world, it provided a financial boon to the area, particularly to San Juan Bautista, where quicksilver was hauled from the mines by 6- to 12-horse freight teams.

Bear Valley, lying 25 miles south of Hollister, was originally occupied by early homesteaders. Large crops of wheat, barley, vegetables and fruit were produced in Bear Valley, known for its deep, fertile soil.

A list of archaeologically and historically significant sites and structures has been compiled, the locations of which are shown on Plate 9. This is by no means a comprehensive list and should be updated following the completion of a thorough inventory of San Benito County's cultural resources.